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Editorial

Mathematical Methods for Heat Transfer and Thermodynamic Analysis of Conductive, Convective, and Radiative Media

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The rapidly growing needs for energy and their associated environmental problems have led to the formation of most challenging issue facing human civilization. This has massively signified the role of energy analysis and optimization in a wide range of engineering disciplines. Further, the recent advancement in manufacturing of small scale devices and introduction of synthetic materials has added new dimensions to energy analysis. Historically, thermal energy analysis included first law investigations or heat transfer analyses. Over the last two decades, it was demonstrated that such analyses could be lacking and do not provide a complete picture for many applications. Hence, combined first and second law analyses were conducted mostly on convective systems. More recently, the problems which chiefly involve conduction in complex media, such as porous or multilayer media, started to attract attention of the research community. This class of problems is essential in a number of applications including energy systems, energy storage, underground reservoirs, and micro- and nanoscale manufacturing. Optimization of combined conduction, convection, and radiation of heat and the resultant generation of entropy in these applications introduces a very rich and mostly unexplored problem.

This special issue brings about various problems in these fields through comprehensive considerations. Editors hope that provided problems and investigations help engineers and scientists regarding optimum thermophysical designing conditions for discussed systems.

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